

MONTHLY WEATHER REVIEW.

VOL. XII.

WASHINGTON CITY, NOVEMBER, 1884.

No. 11.

INTRODUCTION.

This REVIEW contains a general summary of the meteorological conditions which prevailed over the United States and Canada during November, 1884, based upon the reports from the regular and volunteer observers of the Signal Service and from co-operating state weather services.

Descriptions of the storms which occurred over the north Atlantic ocean during the month are also given, and their approximate paths shown on chart i.

Under "Areas of low barometer" are described eleven atmospheric depressions, this number being one and eight-tenths less than the average for November during the last eleven years. The average hourly movement of the depressions for November, 1884, is thirty-five and two-tenths miles, which exceeds by five miles, the average hourly movement of the November storms during the preceding eight years. The storms numbered iii. and ix. were the severest that occurred during the month, and were accompanied by dangerous gales during their passage.

The month was unusually warm in the western parts of the country; it was slightly warmer than the average on the Atlantic coast, and slightly colder than the average in the lake region, central Ohio valley and Gulf states.

The precipitation was below the average in nearly all districts, the deficiencies being greatest in the northern and middle Pacific coast regions, and in the Ohio valley and Tennessee; it exceeded the average in Florida and the middle and southern slopes.

In the preparation of this REVIEW the following data, received up to December 20th, 1884, have been used, viz.: the regular tri-daily weather-charts, containing data of simultaneous observations taken at one hundred and twenty-nine Signal Service stations and eighteen Canadian stations, as telegraphed to this office; one hundred and fifty-nine monthly journals; one hundred and sixty-four monthly means from the former, and eighteen monthly means from the latter; two hundred and sixty-six monthly registers from voluntary observers; forty-six monthly registers from United States Army post surgeons; marine records; international simultaneous observations; marine reports, through the co-operation of the "New York Herald Weather Service;" abstracts of ships' logs, furnished by the publishers of "The New York Maritime Register;" monthly weather reports from the local weather services of Alabama, Indiana, Iowa, Louisiana, Minnesota, Missouri, Nebraska, Ohio, and Tennessee, and of the Central Pacific Railway Company; trustworthy newspaper extracts; and special reports.

ATMOSPHERIC PRESSURE.

[Expressed in inches and hundredths.]

The mean atmospheric pressure for November, 1884, determined from the tri-daily telegraphic observations of the Signal Service, is exhibited by the isobarometric lines on chart ii. The area of barometric minima, which has occupied the middle and southern plateau districts since April, has now disappeared (an increase in the monthly means over those for October of from .17 to .27 having taken place) and an area of barometric maxima occupies the middle plateau, the mean pressure at Salt Lake City, Utah, being 30.35. The isobar for 30.2 includes nearly the whole of the Rocky mountain region and extends southeastward to central Texas. The area of least pressure is shown over the Gulf of Saint Lawrence, the lowest barometric mean, 29.9, being reported from Father Point, Province of Quebec.

As compared with the preceding month, an increase has occurred in all districts west of the Mississippi river; a slight increase has also occurred in Mississippi, Alabama, Florida, and Wisconsin. If a line were drawn connecting the stations where no change has taken place, it would extend from Marquette, Michigan, through Milwaukee, Wisconsin, and Davenport, Iowa, to central Missouri, and thence southeastward through Memphis, Nashville, and Knoxville, Tennessee, to the south Atlantic coast between Jacksonville and Sanford, Florida. To the eastward of this line the barometric means have decreased, the departures being greatest (from .05 to .09) in the Saint Lawrence valley, lower lake region, New England, and middle Atlantic states, but are not so marked as in the districts where the pressure has increased. At Denver, Colorado, and Salt Lake City, Utah, an increase of .27 has occurred, and between the one hundredth and one hundred and seventeenth meridians, except in southern California, the increase is everywhere above .10, while along the Pacific coast it varies from .01 to .08.

The departures from the normal pressure are exhibited on chart iv., from which it will be seen that along the Pacific coast and over the eastern half of the country the mean pressure for November, 1884, is below the normal, while, over the extreme northwest, southern Texas, eastern Rocky mountain slope, and the western plateau districts it is above the normal. In the table of miscellaneous meteorological data for Signal Service stations will be found the departures for the several stations.

BAROMETRIC RANGES.

The monthly barometric ranges were greatest in the upper lake region and northern New England; they were least over the western portions of the country and the Florida peninsula. The extreme ranges are: least, .22 at Key West, Florida, and .32 at Los Angeles, California; greatest, 1.17 at Alpena, Michigan, and 1.20 and 1.34 at Portland and Eastport, Maine, respectively. In the table of miscellaneous meteorological data are given the monthly ranges at various stations.

AREAS OF HIGH BAROMETER.

Five areas of high barometer passed over the districts east of the Rocky mountains, while the barometer remained decidedly above the normal for the month over the plateau regions from the 1st to the 20th and during the latter part of

the month, the pressure declining in these regions during the 21st and 22d, when the second period of high pressure followed and remained until the close of the month, apparently reinforced by a high area from the north Pacific coast. At the close of the month a well-defined area covered the central plateau region. Three of these areas first appeared north of Montana and one passed eastward north of the United States, while the remaining two were apparently secondary areas passing eastward from the mountain regions within the limits of the station of observation.

I.—On the morning of the 1st two depressions were moving eastward from the Missouri valley, one north of the lower lake region and the other central in the upper Mississippi valley, while this large area extended over the mountain districts. The low areas referred to above apparently united during the night of the 1st and passed northeast of New England during the 2d, followed by this high area, which extended over the Ohio valley and was central in the middle Atlantic states at the morning observation of the 3d. The pressure increased at the central stations within this area as it moved eastward, and upon reaching the Atlantic coast the course changed from east to north of east, passing over Nova Scotia, where the barometer rose to 30.50 on the morning of the 4th. This area passed eastward from the central Rocky mountain region, while the barometer continued high in these districts after this area had passed to the eastward.

II.—The morning weather map of the 3d exhibited a high area in the upper Missouri valley, extending southward over the mountain districts as far as New Mexico and northern Texas. The succeeding reports of the 3d indicated that this volume of cold air was moving slowly eastward, reinforced by a cold wave from the regions north of Dakota. On the morning of the 4th the highest barometric readings were observed north of Dakota, while the pressure was from .20 to .40 of an inch above the normal on the eastern slope as far south as Texas. These conditions continued until the 5th, when this area passed almost directly southward over the lower Missouri valley, causing frosts in northern Texas, northern Louisiana, and Georgia on the 6th and killing frosts in the central portions of the Gulf states on the 7th, when the region of greatest pressure included within its area the lower Mississippi valley. This high area did not reach the Atlantic coast, but disappeared by a gradual fall of the barometer in the Southern states, the barometer remaining decidedly above the normal in the Rocky mountain region.

III.—The barometer continued high in the Rocky mountain region from the 7th until the 15th, with no decided movement to the eastward. On the afternoon of the 15th this high area was apparently increased by the advance of a cold wave from the region west of Manitoba. The morning report of the 16th indicated that this condition would extend rapidly over the central valleys and the lake region. On the 17th the crest of this cold wave was apparently in northern Minnesota, but the cold northerly winds extended over the upper lake region and the northwest. At the morning report of the 17th this area extended from the lower lake region to the north Pacific coast and southward to northern Texas, the barometric gradient being greatest in the eastern quadrants. This area passed eastward north of the lake region, crossing the Saint Lawrence valley on the 18th and moving northeastward over the Maritime Provinces on the 19th. The pressure decreased near the centre of this area as it passed over the lake region, and increased as it passed over the Atlantic coast districts.

IV.—This area apparently developed over the southern Rocky mountains during the 18th, and it was probably a secondary area formed from the cold, dry air which passed southward from area number iii. It was at no time well-defined by the isobarometric lines on the weather charts while west of the lower Mississippi river. Killing frosts occurred in central Texas and northern Louisiana on the 20th as this area passed eastward over that section. After reaching the east Gulf states the course of this area changed to the northeast, and it passed

over the middle Atlantic states with increasing pressure. On the 22d it was east of New England, when the barometer was .2 of an inch higher than it was within the area when passing over the Gulf states. The movement continued to the northeast during the 23d, when this area disappeared to the eastward of Nova Scotia.

V.—This area appeared north of Dakota on the 22d, and continued central in that region on the 23d, when the temperature ranged from -10° to -27° . This was the most severe cold wave of the month, the temperature falling from 30° to 50° in twenty-four hours at numerous stations in the Mississippi and Ohio valleys, and as low as freezing in northern Louisiana on the 24th. This high area passed directly south from Manitoba to Indian Territory, and thence eastward over the Gulf and south Atlantic states, attended by light frosts in northern Florida and killing frosts in southern Alabama on the 25th. From the 25th until the close of the month a high area extended over the plateau regions, and this area was increased by the advance of a second high area from the north Pacific coast region on the 26th.

AREAS OF LOW BAROMETER.

Eleven areas of low barometer have been traced on the tri-daily weather maps of November. They were generally first observed on the eastern slope of the Rocky mountains in high latitudes. Three developed within the limits of the stations; one was an Atlantic storm apparently passing northward, following the general course of the Gulf stream; and they all passed towards the Saint Lawrence valley or the Maritime Provinces, carrying the mean latitude of these disturbances for the month to the northward of the average storm-tracks for November. Of the storms traced from the lower latitudes it is observed that they have a more northerly course than the storm-tracks of the preceding month.

The following table gives the latitude and longitude in which each area of low barometer was first and last observed, with the average hourly velocity while within the regions of observation:

Areas of low barometer.	First observed.		Last observed.		Average velocity in miles per hour.
	Lat. N.	Long. W.	Lat. N.	Long. W.	
No. I.....	47 00	99 00	47 00	58 00	32.0
II.....	42 00	101 00	47 00	82 00	41.0
III.....	36 00	93 00	48 30	64 00	29.5
IV.....	51 00	08 00	46 00	80 00	22.5
V.....	50 00	87 00	51 00	65 00	30.0
VI.....	52 00	98 00	43 00	63 00	34.0
VII.....	54 00	105 00	45 00	78 00	29.0
VIII.....	39 00	67 00	44 00	60 00	33.0
IX.....	38 00	102 00	50 00	65 00	30.0
X.....	49 00	105 00	47 30	77 00	50.0
XI.....	27 00	95 00	49 00	61 00	50.0
Mean hourly velocity, November, 1884					35.2
Mean hourly velocity for November for last eight years					30.2

I. and II.—Number i. developed in the upper Missouri valley on the 30th of October, and passed directly eastward over the upper lake region during the 31st, first inclining slightly to the southward, and after passing Lake Michigan, changing to the northward until its centre reached latitude 49° in the Saint Lawrence valley, when the course changed slightly to the southward, crossing the Saint Lawrence valley and passing to the southward of Newfoundland. The a. m. chart of the 1st exhibited two well marked depressions—number i. central north of Lake Ontario and number ii. central near Davenport, Iowa; the former had been traced during the two preceding days from Dakota and the latter from western Nebraska. These low areas moved eastward during the 1st, and number ii., after passing to the lower lake region, united with number i. in the lower Saint Lawrence valley at midnight of the 1st. Light showers occurred in the northern districts east of the Missouri valley while these depressions were passing eastward, and fresh to brisk winds were reported from the stations on the lower lakes, but no marked disturbance was observed.

The observer at Eastport, Maine, reports that high north-easterly winds (maximum velocity thirty-four miles) prevailed during the 2d, and that the schooner "Alaska" had main sail split and was left in a helpless condition near the shore off Head Harbor, New Brunswick. Twenty schooners remained in harbor at Eastport during the signal display for this storm.

III.—This storm developed in northern Arkansas on the afternoon of the 3d, while extended high areas were observed on the Atlantic coast and in the Rocky mountain regions. It increased in energy rapidly, moving to the northeast between the high pressure areas above referred to, attended by general rains in the lake regions and the central valleys. These rains extended to the Atlantic coast by the morning of the 4th, the precipitation being very heavy north of Cape Hatteras, North Carolina. After passing over the lower lakes this depression divided, forming a secondary storm in southern New England while the principal disturbance passed down the Saint Lawrence valley, the two areas uniting at midnight of the 5th, north of New England. Dangerous gales occurred in the lake region and on the middle Atlantic and New England coasts on the 4th and 5th, the wind reaching a velocity of fifty-two miles an hour at Buffalo and at Sandy Hook, and gales occurred generally throughout the Maritime Provinces on the 5th. This storm was followed by a second disturbance from Manitoba on the 6th, which passed rapidly to the eastward north of the lake region, causing dangerous winds on the 7th, a velocity of fifty-six miles an hour occurring at Buffalo when this secondary depression extended over the lower Saint Lawrence valley.

The following notes from the reports of Signal Service observers relate to this storm:

Escanaba, Michigan, 5th: the wind blew with more or less severity during the day, a velocity of thirty miles being recorded both before and after noon; no damage resulted from the storm in this vicinity.

The signal displayman at South Haven, Michigan, reports that the schooner "Anna Thorine" went ashore at 4 a. m. on the 6th, while attempting to enter that harbor.

Rochester, New York, 4th: brisk southeasterly wind at 11.35 a. m., veering to southerly and increasing in force until 1.10 p. m., when a velocity of forty miles per hour from the south was recorded. High winds also prevailed on the 5th from 2 to 7.30 a. m., a maximum velocity of thirty-nine miles, west, occurring at 4.35 a. m. On the 7th brisk southwesterly winds occurred, veering at 9.45 a. m. to high westerly and increasing in force; maximum velocity forty-eight miles, west, at 1.45 p. m.; wind velocity fell below twenty-five miles at 7.15 p. m.

Oswego, New York: the three-masted schooner "Agnes Hope," lumber-laden, lost her deck load, filled with water, and was abandoned when about fifteen miles out from this port, at 3 p. m. on the 6th.

The observer at Eastport, Maine, reports that fifteen schooners remained in that harbor during the signal display for this storm.

Reports from Father Point state that the storm during the night of the 4-5th was of unusual violence. The high sea inundated the fields in all the parishes along the coast, and several buildings near that place were carried away. The town of Rimouski was inundated, and a large number of barns, stables, and wharves were carried away. The losses sustained at Rimouski are estimated at \$30,000. At Saint Anne de Monts fifteen houses were destroyed, and a considerable quantity of wood was swept away. A number of fishing boats were totally demolished, having drifted on the rocks. At Notre Dame du Portage three houses were swept away.

The following extract is from the "New York Herald" of November 6th:

HALIFAX, N. S., November 5, 1884.—Early this morning a violent storm set in from the southwest and continued until noon with much severity. The rain came down in torrents, and the greater part of the time a small hurricane was blowing. No special damage to shipping in dock has been reported, except that some vessels were badly chafed. In the Northwest Arm the water was exceptionally high, coming right up on the road. Ship-own-

ers are somewhat anxious, as it is feared that vessels near the coast may have suffered.

IV.—This was a low area of slight energy which appeared in the Northwest Territory on the 8th; it passed over Manitoba on the 8th, and southeastward over Lake Superior on the 9th, causing no marked change in the weather conditions in the United States. This area was at no time enclosed by isobars within the limits of the stations, and after the p. m. report of the 10th, it apparently passed to the north of the lower lake region.

V.—This area appeared farther to the north than the preceding one (number iv.), and the centre could be only approximately determined at the successive reports from the 12th, 3 p. m., until the midnight report of the 13th. It caused but slight changes in the weather conditions within the United States, but developed considerable energy while passing to the eastward over the Canadian stations. The easterly movement was retarded when this depression reached the Gulf of Saint Lawrence, and strong northwest gales occurred in the lower Saint Lawrence valley on the 15th.

VI.—This was first located as central in Manitoba on the afternoon of the 15th. It passed rapidly over the lake region, upper Saint Lawrence valley, and New England during the 16th and 17th, and disappeared northeast of Nova Scotia. The barometer fell at the centre of this depression as it moved eastward, and the strongest winds occurred after they had shifted to the northward.

The Signal Service observers report the following in connection with this storm:

Escanaba, Michigan, 16th: the wind reached a velocity of twenty-five miles per hour from the south, at 8.30 p. m., and continued high during the night, a velocity of thirty-one miles northwest, occurring at 1.34 a. m. on the 17th. The propeller "Merrimac" arrived during the morning of the latter date, and reported that on Lake Michigan the wind blew with a velocity of not less than fifty miles per hour.

Alpena, Michigan, 17th: high winds prevailed during the morning, a maximum velocity of twenty-seven miles per hour from the northwest having been recorded. The schooner "Thomas P. Shelton" went ashore on Middle Island during the storm, but sustained no serious injury.

Port Huron, Michigan, 17th: high northwesterly winds began about 4 a. m. and continued with more or less severity during the day; a maximum wind velocity of twenty-eight miles per hour occurred at 2.37 p. m. During this storm on Lake Huron all vessels in this port were detained; the schooner "Frank Morris," when off Forester, Michigan, had two of her crew swept overboard.

A storm passed northward east of Cape Hatteras on the 16th, causing unusually heavy rain on the North Carolina coast and wind velocities ranging from thirty-six to forty-eight miles an hour from the north, backing to westerly, thus showing the northerly movement of the storm which passed to the east of the coast.

The following extract is taken from "Science" for December 19, 1884:

The American brigantine "Senorita" was in latitude 35° 50' north, longitude 74° 12' west, at meridian, November 16, and experienced the severe storm of that date. About 2 p. m. when it was blowing very hard from the northeast, five whirlwinds were seen to the southward and eastward. They were black columns of water about four hundred feet in diameter, and their tops seemed to reach the clouds. They moved with great velocity at right angles with the wind, and, after passing the vessel, disappeared to the northward and westward. Four went ahead of the vessel, and one astern, within half a mile. The whirlwinds were moving at the rate of twenty-five or thirty miles an hour. The appearance of waterspouts in the midst of a gale, and moving at right angles to the wind, is quite unusual.

VII.—This disturbance was probably central north of Montana on the afternoon of the 18th. It moved rapidly to the southeast over Manitoba and Lake Superior during the 19th, followed by a decided fall in temperature and light snows. The barometer was lowest near Marquette, Michigan on the morning of the 20th, although it had risen at the centre dur-

ing the southeasterly movement of the area. This storm was not severe in any district, although dangerous winds occurred at several stations in the lake region. After passing over Lake Superior this area became less clearly defined and could no longer be traced on the tri-daily charts.

VIII.—This depression could not be definitely traced from the observations taken at land stations, but the reports indicate that a storm of considerable energy passed northeastward along the Atlantic coast about the 20th. On the 19th the barometer was high in the northeast and a steep barometric gradient was observed to the south of Nova Scotia, and a high wind of forty-two miles per hour from the northeast occurred at Block Island, Rhode Island. The centre of the storm was probably near latitude N. 40°, longitude W. 67°.

IX.—On the 21st the barometer was low in all districts on the Pacific coast, in the plateau regions, and generally in the mountain regions south of Montana, while a high area extended over the states east of the Mississippi river. This area was first observed at the afternoon report of the 21st central in eastern Colorado. It developed rapidly and passed to the Missouri valley by the morning of the 22d, passing between the high area to the east and a second cold wave which extended over the northwestern districts from Lake Superior to Idaho. This storm was apparently pushed to the southward by the cold wave during the eight hours between the morning and afternoon reports of the 22d, but it extended in a trough-like form, from the upper lake region to the west Gulf coast. Very heavy rains occurred to the south and east of the centre of this area when in the Mississippi valley, and cold northerly winds with snow, followed in the northwest quadrant of this storm as it passed over the lake region. This storm was the most violent of the month in the lake region, and it was followed by a cold wave which closed navigation on the canals in New York and at a number of lake ports. Rain turned to sleet and snow as the centre passed to the northeast and the winds increased in force after shifting to the west; the highest velocity reported was sixty miles per hour at Buffalo, New York. This low area followed the general course of the Saint Lawrence valley, but was of such energy as to cause dangerous northwest gales on the Atlantic coast north of Cape Hatteras, when the centre was north of Halifax, Nova Scotia, on the 24th.

Concerning this storm the following notes have been reported by the Signal Service observers.

Galveston, Texas: the barometer fell rapidly on the 22d, the lowest reading (29.64) being observed about noon; at 1 p. m. it read 29.76; and at 3 p. m., 29.71. After 10 a. m. the wind shifted to northwest and reached a velocity of thirty-seven miles per hour at 11.42 a. m.; the velocity fell below twenty-five miles per hour at 12.14 p. m.

Louisville Kentucky: heavy rain fell during the early morning of the 22d, and a wind velocity of thirty-six miles per hour was recorded at 9.45 a. m.

Duluth, Minnesota, 21st: light snow began at 9.10 a. m., continuing all day and during the 22d, with high northeast to northwest winds on the latter date, a maximum velocity of forty miles per hour occurring at 9.30 p. m.

Escanaba, Michigan, 23d: at 2.20 a. m. the wind shifted to northwest; it afterwards increased in force and continued throughout the day; a velocity of thirty-two miles per hour from the northwest occurred both before and after noon. Several vessels put into this port during the storm, and reported unusually rough weather on the lake.

Milwaukee, Wisconsin, 23d: a northwesterly gale began at 5.17 a. m. and continued all day; it was very severe on Lake Michigan, but, owing to the lateness of the navigation season, a comparatively small number of vessels were caught in the storm, although several put into this port, some having sustained damage. The signal for this storm was displayed on the 21st; it was justified by a velocity of forty-one miles per hour and gave ample warning to vessels and others interested.

Grand Haven, Michigan 23d: about 9.30 a. m. the wind

shifted to northwest, increasing in force and attaining a velocity of thirty-nine miles at 12.06 p. m. The propellers "Michigan" and "Wisconsin" left this port for Milwaukee, but were compelled to return, the "Michigan" sustaining damage estimated at \$2,500.

Detroit, Michigan, 23d: a southeasterly storm began at 12.04 a. m., continuing during the night and following day; the wind reached its greatest force, forty miles, southeast, at 6.54 a. m.; at 12.30 p. m. the wind shifted to southwest and later to west, moderating at 6 p. m., but during the night of 23-24th it increased in force and continued high until 11 a. m. of the latter date.

Toledo, Ohio, 22d: after 11 p. m. the wind blew in gusts of considerable violence and continued to increase in force; at 4.54 a. m. on the 23d it reached twenty-five miles per hour, and afterwards blew in violent gusts, the maximum velocity, forty miles per hour from the southwest, occurring at 12.49 p. m.; the wind continued high until 9.20 p. m., when it subsided. This storm was of unusual severity and caused much damage. In Toledo, buildings were unroofed and trees blown down, while in the surrounding country the corn shocks were scattered, and telegraph lines, fencing, etc., were prostrated. The cautionary signal for this storm was displayed fourteen hours in advance of it, and it was due to this, in a great measure, that no marine disasters occurred.

Buffalo, New York, 23d: the storm of this date was the severest that has occurred here for several years; it began with a south wind at 12.18 a. m., which continued with great force, reaching a velocity of forty-nine miles per hour at 8.15 a. m. The barometer fell during the day until shortly after 3 p. m., being at that hour 29.43. The wind then suddenly veered to west, increasing in force and attaining a velocity of sixty miles per hour; the wind continued high until about 4.40 a. m., on the 24th. A large amount of damage was done along the docks, and throughout the city, signs, trees, etc., were blown down; numerous buildings were unroofed or otherwise damaged. A large new church building was unroofed and the front blown in, causing a loss of \$20,000. Captains of vessels and others state that the warning given for this storm prevented many disasters, and that the storm was one of the severest ever experienced at this place.

Rochester, New York, 23d: high southerly, veering to westerly winds prevailed during the morning, the highest velocity, forty-four miles per hour from the south, having occurred at 10 a. m.; the winds continued high until the early morning of the 24th.

The observer at Norfolk, Virginia, reports that several steamers remained in port on the 23d during the signal display, which was justified by a wind velocity of twenty-five miles per hour from the south.

At New York City a strong westerly gale prevailed from 2.25 to 9.17 p. m., of the 23d, the wind attaining a velocity of forty miles; many minor disasters occurred; steamers were delayed and telegraphic communication seriously interrupted.

Reports from Bridgeport, Connecticut, state that the storm on the evening of the 23d was the severest experienced for many years. Similar reports are also received from other towns in Connecticut, Rhode Island, and Massachusetts. At Ellsworth, Maine, several schooners dragged anchor.

The observer at New London, Connecticut, reports that a southeasterly gale began at 10.50 a. m., reaching its height at 11.20, when a wind velocity of forty-nine miles was recorded, causing vessels in the harbor to break from their anchors. This was one of the severest storms that has occurred for several years. The observer also states that the cautionary signal gave ample warning of its approach and that the display was favorably commented upon by ship-masters and ship-owners.

The observer at Boston reports as follows: The gale began at 1.49 p. m. on the 23d and continued until 7 p. m. on the 24th; considerable damage was done in this city and vicinity, telegraph lines and trees being prostrated. No marine casualties were reported; the timely warning of the storm's approach

given by the storm signal detained many vessels in this harbor, the signal having been displayed twelve hours in advance of the storm; the highest velocities of the wind recorded were forty-seven miles, south, at 11.54 p. m. on the 23d, and forty-four miles, south, at 1.30 a. m. on the 24th.

On the summit of Mount Washington, New Hampshire, the most violent hurricane that has occurred since last winter prevailed on the 23d. The wind blew with great violence from the south all day, reaching a velocity of 128 miles per hour during the night; the hurricane abated during the early morning of the 24th.

X.—This disturbance was first observed in the upper Missouri valley at the afternoon report of the 24th. The succeeding report showed a slight depression in southeastern Dakota, and during the following eight hours, a slight depression passed over the upper lake region, attended by light snow north of the Ohio valley. This storm was not severe in any section of the United States, although general snow fell in the northern districts, and numerous high winds were reported from the lake region, the velocity at Buffalo reaching forty miles per hour. This storm apparently passed northward, beyond the limits of stations, on the 26th.

XI.—The morning reports of the 27th indicated the speedy development of a storm in the western part of the Gulf of Mexico, and the succeeding reports of that date showed the north-easterly movement of the storm, the centre at midnight being near New Orleans, and the cold wave which was approaching from the northwest had reached Indianola, Texas, causing a "norther" in that region. This storm extended rapidly to the northeast over the Southern, middle Atlantic, and New England states, causing heavy rains and high winds on the coast. It followed the general direction of the coast line after passing over the south Atlantic states, the depression being much elongated in the direction of the movement. The barometer fell rapidly as the storm passed to the northeastward and when last observed, on the afternoon of the 29th, it had fallen to 29.06 at Anticosti, which, at that time was near the centre of disturbance.

NORTH ATLANTIC STORMS DURING NOVEMBER, 1884.

[Pressure expressed in inches and in millimetres; wind-force by scale of 0-10.]

The paths of the depressions that have appeared in the north Atlantic ocean during the month, are determined, approximately, from reports of observations furnished by captains and agents of ocean steamships and sailing vessels; from data obtained through the co-operation of the "New York Herald Weather Service," and from other miscellaneous data received at this office up to December 23d, 1884.

The observations used are, in general, simultaneous, having been taken each day at 7 a. m. Washington, or 12 hrs. 8 m. p. m. Greenwich mean time.

Nine depressions are shown on the chart for November, 1884; of these, four, viz: numbers 2, 3, 8, and 9, are continuations of storms which first passed over the United States and Canada, and are partly described, under "areas of low barometer," in this REVIEW. One depression appeared in the region between N. 30° and 35°, and W. 70° and 75°, and passed northeastward, causing heavy rains and gales on the coast of the Carolinas. The remaining depressions developed over the Banks of Newfoundland, or in mid-ocean. Only one storm, number 1, appears to have reached the British Isles from the Atlantic; the others either filled in, or passed far to the northward of those islands.

During the first and second decades of November, 1884, the weather over the north Atlantic north of 40° N. was marked by a succession of moderate to strong gales from s. to nw.; with rain or sleet and high seas; during the last decade, strong breezes, increasing to gales at the close of the period, prevailed; as a whole, however, the weather was not more stormy than is usually experienced in the north Atlantic during the month of November.

During the greater part of the month an area of high ba-

rometer appears to have existed near the European coasts and to have spread westward over the Atlantic ocean for a considerable distance, and fine weather, with light to moderate easterly winds prevailed over the region south of the fortieth parallel and from the European coast westward to about 35° W.

The following descriptions refer to the depressions charted:

1.—On the 1st an area of low barometer, at the centre of which the pressure was less than 29.5 (749.3), was to the southward of Newfoundland, causing strong easterly gales along the southern coast of that island, with moderate to strong s. and se. gales between W. 55° and 60°, and moderate northerly winds in Nova Scotia. Some loss of life and much damage to shipping occurred along the Newfoundland coasts during the prevalence of those gales. On the 2d the depression having moved rapidly northeastward, was shown near N. 53° W. 37°, where the lowest pressure reported was 29.53 (750.0); strong winds to moderate gales occurred in all quadrants. The reports indicate that a rapid decrease of pressure occurred during the 2d, and by the 3d the barometer at the storm-centre, near N. 54° W. 27°, was below 29.0 (736.6), and the winds had increased to strong gales. The following reports show the violence of this storm:

Captain G. Cochrane, commanding the s. s. "The Queen," reported: "November 2d, 8 p. m. Greenwich time, lat. 49° 44' N., long. 18° 25' W., barometer 30.05 (763.3), wind backing to southward and rapidly increasing, with gusts; barometer falling; midnight, fresh gale from sse. and backing to se. with confused sea. November 3d, 3 a. m., barometer 29.35 (745.5); wind suddenly shifted in a heavy squall with rain, to ssw., and gradually hauled to wsw.; by 8 a. m. it was blowing a fresh gale with high sea, barometer still falling slowly after the shift of wind. At noon, lat. 49° 28' N., long. 22° 47' W., strong gale with fierce squalls and very heavy wsw. sea; 4 p. m., weather the same, barometer 29.17 (740.9); at 8 p. m. wind w., but no abatement in the fury of the gale and a tremendous sea running; midnight, still blowing furiously with very heavy and dangerous westerly sea running, barometer steady since 4 p. m. At 4 a. m. of November 4th wind hauling to wnw., barometer rising slowly, weather settling into a strong wnw. gale and squally, with heavy wnw. sea running; noon, lat. 49° 12' N., long. 25° 17' W., gale moderating and sea going down."

Captain W. P. Couch, commanding the s. s. "Ontario," between N. 56° 38', W. 24° 32', and N. 55° 55', W. 31° 00', reported: "November 2d, 17 hrs. 40 m., barometer began to fall rapidly, the wind increasing till noon, when it was blowing a strong gale with high sea from e. $\frac{1}{2}$ s., barometer 28.82 (732.0), with rain and dull weather; at 3 hrs. 40 m. of the 3d, wind shifted to s. $\frac{1}{2}$ w., and moderated suddenly; 5 hrs. 40 m., light airs and calms, barometer 28.77 (730.7), until 10 hrs. 44 m., when the breeze sprang up from n. $\frac{1}{2}$ e., increasing to a gale of force 8, with confused sea and rainy weather; at noon barometer rising and wind decreasing to a fresh breeze, barometer 29.66 (753.7)."

Captain Laub, commanding the s. s. "Thingvalla," reported, "November 2d, in N. 54° 15', W. 33° 50' at 8 p. m., (ship's time) barometer 29.25 (742.9) wind ese. force 9, high nw. sea, rain; 9 p. m. 29.16 (740.7) wind ese. 10, high nw. sea, rain; 10 p. m. 29.07 (738.4), wind e. by s. 10, sea going down; 11 p. m. 29.00 (736.6), wind e. 10; midnight, 28.92 (734.6), wind e. by n. 8. November 3d, 1 a. m. barometer 28.86 (733.0), wind e. by n. force 7, confused sea; 4 a. m. 28.69 (728.7), wind ne. by e. force 5, confused sea; 6 a. m. 28.55 (725.2), wind ne. by n. 7, confused sea; 8 a. m. 28.46 (722.9), wind ne. by n. 7, high and long sea-swell from s.; 10 a. m. 28.54 (724.9), wind ene. force 3, same sea-swell; noon, (N. 54° 58', W. 30° 40'), barometer 28.54 (724.9), wind e. force 5; 5 p. m. barometer 28.55 (725.2), wind nne. force 6; 8 p. m. 28.62 (726.9), wind n. force 6; midnight, 28.62 (726.9), wind n. 6. November 4th, 6 a. m. barometer 28.66 (728.0), wind nnw.; noon, 28.71 (729.2), wind nnw, (N. 55° 57' W. 24° 34').

During the 3d, vessels between N. 45° and 55° and from W.